

## Grass Lake

### Site Description

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#### **Location**

Water designation number (WDN)	05-0008-00
Legal description	T118N-R54W-Sec. 6; T118N-R55W-Sec. 1,2 T119N-R54W-Sec. 30,31; T119N-R55W-Sec. 25,26,35,36
County (ies)	Codington
Location from nearest town	1.5 miles northwest of Florence, SD

#### **Survey Dates and Sampling Information**

Survey dates	May 29-30, 2013 (GN)
Gill net sets (n)	4

#### **Morphometry (Figure 1)**

Watershed area (acres)	8,841
Surface area (acres)	≈2220
Maximum depth (ft)	≈9
Mean depth (ft)	unknown

#### **Ownership and Public Access**

Grass Lake is a meandered lake owned by the State of South Dakota and the fishery is managed by the SDGFP. A single public access site is located on the east shore, off State Highway 20 (Figure 1; Figure 2) and is maintained by the SDGFP. Lands adjacent to Grass Lake are under mixed ownership by the State of South Dakota, U.S. Fish and Wildlife Service, and private individuals.

#### **Watershed and Land Use**

The 8,841 acre Grass Lake sub-watershed (HUC-12) is located within the larger Grass, Dry, and Still Lakes (HUC-10) watershed. Land use within the watershed is primarily agricultural with a mix of pasture or grassland, cropland, and scattered shelterbelts.

#### **Water Level Observations**

No OHWM or outlet elevation was available for Grass Lake. The elevation of Grass Lake on May 21, 2013 was 1746.7 fmsl, approximately 1.0 ft higher than the fall 2012 elevation of 1745.7 fmsl. On October 9, 2013 the water level had declined to an elevation of 1746.1 fmsl.

#### **Fish Management Information**

Primary species	Walleye, Yellow Perch
Other species	Black Bullhead, Common Carp, Northern Pike, White Sucker
Lake-specific regulations	none
Management classification	warm-water marginal
Fish consumption advisories	none

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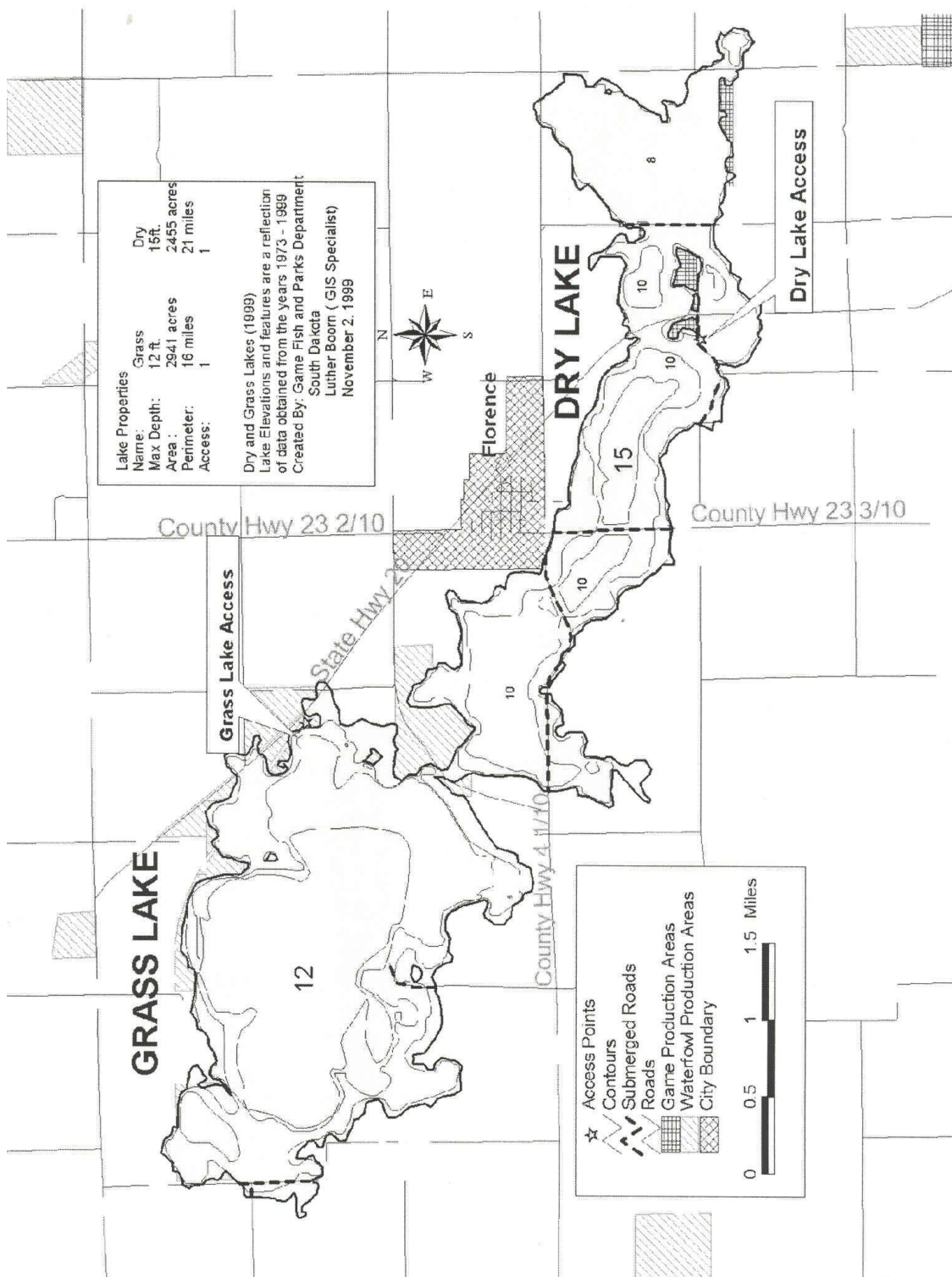


Figure 1. Map depicting depth contours of Dry and Grass Lakes, Codington County, South Dakota.



Figure 2. Map depicting geographic location of the public access site and standardized net sites for Grass Lake, Codington County, South Dakota. GRGN= gill net

## Management Objectives

- 1) Maintain a mean gill net CPUE of stock-length Walleye  $\geq 10$ , a PSD of 30-60 and a PSD-P of 5-10.
- 2) Maintain a mean gill net CPUE of stock-length Yellow Perch  $\geq 30$ , a PSD of 30-60 and a PSD-P of 5-10.

## Results and Discussion

Grass Lake is a shallow slough with limited sport fishery potential. However, during periods of above normal precipitation both surface area and depth of the lake increase, which diminishes the threat of winterkill and allows sport fish (e.g., Walleye) populations to expand.

In the late 1990s, water levels were high (SDDENR 2014) and abundant Walleye and Yellow Perch populations developed in Grass Lake. The lake quickly became a popular destination for anglers. Unfortunately, water levels declined during the mid-2000s limiting sport fish populations and causing SDGFP to suspend fish stockings. From 2008-2011 water levels increased approximately 1.8 m (6 ft) and fish stockings resumed (Table 4; SDDENR 2014). Currently, Grass Lake is managed as a Walleye and Yellow Perch fishery.

### *Primary Species*

Walleye: The mean gill net CPUE of stock-length Walleye was 26.5 (Table 1) and above the minimum objective ( $\geq 10$  stock-length Walleye/net night). Based on the 2013 gill net CPUE, relative abundance is considered high.

Walleye captured in the gill net catch ranged in TL from 17 to 46 cm (6.7 to 18.1 in) with the majority being  $\geq$  quality-length (38 cm; 15 in; Figure 3). The PSD was 88 and well above the management objective of 30-60; while the PSD-P was 0 as no preferred-length (51 cm; 20 in) Walleye were sampled (Table 1; Table 3; Figure 3).

Otoliths were collected from a sub-sample of gill net captured walleye. Age structure information indicated that all sampled Walleye were from year classes produced in 2010-2012, which coincided with fry and small fingerling stockings (Table 2; Table 4). The 2010 cohort was the most represented and comprised 86% of Walleye in the gill net catch (Table 3). The weighted mean TL at capture of age-3 (2010 year class) Walleye was 426 mm (16.8 in; Table 3). The majority of gill net captured Walleye were in the quality-preferred length category, which had a mean Wr of 89.

Yellow Perch: Four gill net nights resulted in the capture of eight individuals that ranged in TL from 10 to 27 cm (3.9 to 10.6 in). The mean gill net CPUE of stock-length Yellow Perch was 0.8 (Table 1) and well below the minimum objective ( $\geq 30$  stock-length fish/net night). Currently, relative abundance appears to be low. However, adult Yellow Perch are present and the potential exists for the population to expand.

## *Other Species*

Northern Pike: Northern Pike were the second most abundant fish species in the 2013 gill net catch (Table 1). The mean gill net CPUE of stock-length Northern Pike was 8.5 (Table 1) and indicative of high relative abundance. High relative abundance can be attributed to increased recruitment related to substantial rises in spring water levels that took place from 2009-2011 (SDDENR 2014). Northern Pike depend heavily on flooded vegetation for spawning and recruitment, and tend to have improved recruitment during springs that have rising water levels.

Gill net captured Northern Pike ranged in TL from 49 to 80 cm (19.3 to 31.5 in), had a PSD of 85 and a PSD-P of 21 (Table 1; Figure 4). Size structure indices should be interpreted with caution as sample size was low (i.e., 34 stock-length Northern Pike).

The condition of gill net captured Northern Pike was similar to that of Northern Pike captured from other northeast South Dakota glacial lakes with mean  $W_r$  values that ranged from 80 to 83 for all length categories (e.g., stock to quality) sampled. Stock-length Northern Pike had a mean  $W_r$  of 81 (Table 1) and no length-related trends in condition were apparent.

Other: Black Bullhead, Common Carp, and White Sucker were other fish species captured in low numbers during the 2013 survey (Table 1).

## **Management Recommendations**

- 1) Conduct fish community assessment surveys on an every fifth year basis (next survey scheduled in summer 2018) to monitor fish relative abundance, fish population size structures, fish growth, and stocking success.
- 2) Collect otoliths from Walleye and Yellow Perch to assess age structure and growth rates of each population.
- 3) Stock Walleye ( $\approx 500$  fry/acre) on a biennial basis to establish additional year classes, provided water levels are sufficient.
- 4) Monitor winter and summer kill events. In cases of substantial winter/summer kill the need to re-establish a fishery in Grass Lake should be evaluated. If water levels are sufficient, Walleye and Yellow Perch should be stocked to re-establish a fish community.

Table 1. Mean catch rate (CPUE; catch/net night) of stock-length fish, proportional size distribution of quality- (PSD) and preferred-length fish (PSD-P), and mean relative weight (Wr) of stock-length fish for various fish species captured in experimental gill nets from Grass Lake, 2013. Confidence intervals include 80 percent ( $\pm$  CI-80) or 90 percent ( $\pm$  CI-90). BLB= Black Bullhead; COC= Common Carp; NOP= Northern Pike; WAE= Walleye; WHS= White Sucker; YEP= Yellow Perch

Species	Abundance		Stock Density Indices				Condition	
	CPUE	CI-80	PSD	CI-90	PSD-P	CI-90	Wr	CI-90
<i>Gill Nets</i>								
BLB	1.5	2.5	100	---	83	34	104	5
COC	0.3	0.4	100	---	0	---	118	---
NOP	8.5	3.2	85	10	21	12	81	1
WAE	26.5	8.6	88	5	0	---	89	<1
WHS	0.5	0.5	100	0	100	0	100	94
YEP	0.8	0.4	33	67	33	67	91	5

Table 2. Year class distribution based on the expanded age/length summary for Walleye sampled in gill nets and associated stocking history (# stocked x 1,000) from Grass Lake, 2013.

Survey Year	Year Class			
	2013	2012	2011	2010
2013		4	11	95
# stocked				
fry		1,000		2,000
sm. fingerling			194	
lg. fingerling				

Table 3. Weighted mean TL at capture (mm) for Walleye sampled in experimental gill nets (expanded sample size) from Grass Lake, 2013.

Year	Age		
	1	2	3
2013	182 (4)	312 (11)	426 (95)

Table 4. Stocking history including size and number for fishes stocked into Grass Lake, 2010-2013. WAE= Walleye; YEP= Yellow Perch

Year	Species	Size	Number
2010	WAE	fry	2,000,000
2011	WAE	small fingerling	193,500
	YEP	adult	3,145
2012	WAE	fry	1,000,000

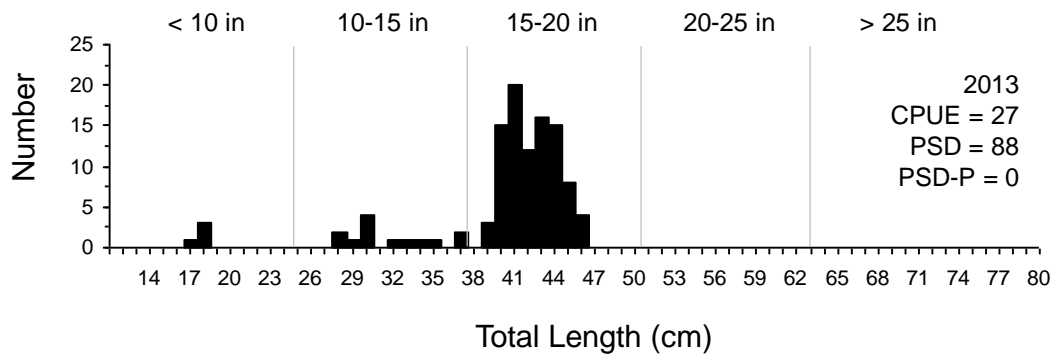


Figure 3. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for Walleye captured using experimental gill nets in Grass Lake, 2013.

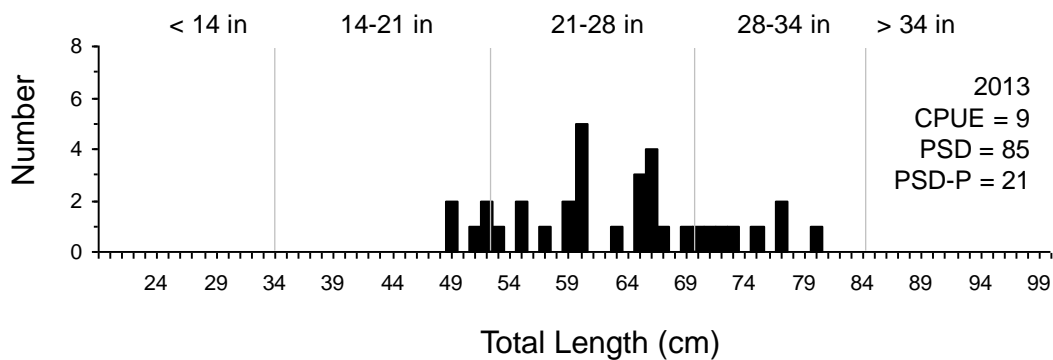


Figure 4. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for Northern Pike captured using experimental gill nets in Grass Lake, 2013.